REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 30-38 are pending in the present application. Claims 30, 31, 33, 35 and 37 have been amended. Claim 32 has been canceled. Support for the changes to Claims 30, 31, 35 and 37 can be found in Applicant's specification on page 11, line 9 through page 12, line 16. The change to claim 33 changes the dependency of the claim to refer back to claim 31. No new matter has been added.

By way of summary, Claim 35 was objected to because of informalities. Claims 31-33 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Claims 37 and 38 were rejected under 35 U.S.C. §102(a) as being anticipated by Yamazaki et al. (U.S. 6,791,112). Claims 30-35 and 36 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamazaki et al. in view of Ueno et al. (PG Pub. No. 2003/0008075).

Turning first to the objection to Claim 35, Applicant believes that no change to the claim is necessary because Claim 35 as presently in the application already contains the language "an insulating substrate" on lines 2 and 3. Accordingly, Applicant requests that the objection to Claim 35 be reconsidered and withdrawn.

Turning next to the rejection of Claims 31-33 under 35 U.S.C. §112, first paragraph, Applicant notes that the third copper diffusion-preventing layer formed on the source region and the drain region is element 52 is found in Figure 11C. The copper wiring layer formed on the third copper diffusion-preventing layer is element 53 in Figure 11C. The fourth copper diffusion-preventing layer formed to surround the copper wiring layer, as claimed in Claim 31, is element 54, also found in Figure 11C. See also pages 40 and 41 of Applicant's specification. In addition, claim 32 has been cancelled in order to overcome the rejection.

From all of the above, Applicant requests that the rejection of claims 31 and 33 under 35 U.S.C. § 112, first paragraph, be reconsidered and withdrawn.

Turning next to the rejection of Claims 37 and 38 under 35 U.S.C. §102 as being anticipated by Yamazaki et al., Applicant has amended Claim 37 to clarify the differences between the present invention and the invention of Yamazaki et al.

The gate electrode shown in FIG. 17D of Yamazaki et al. is described as follows:

> ...the titanium film 1702 is used as the first conductive layer, and a laminate film of the aluminum as its main component film 1703 and the titanium film 1704 is used as the second conductive layer. The first conductive layer and the second conductive layer constitute the first gate electrode. Then, the conductive silicon film 1705 is used as the second gate electrode to cover the first gate electrode, ... it is possible to have another structure of FIG. 17 in which the first gate electrode includes a tantalum film at the lower layer and a film with aluminum as its main component at the upper layer.

To explain the differences between present Claim 37 and Yamazaki et al., Applicant notes that both inventions relate to technology of an electrode structure of a thin film transistor. However, the present invention is different from Yamazaki et al. The conductive layer of Yamazaki et al. corresponds to the copper layer of the present invention. However, the side, upper and lower surfaces are surrounded by the first and second copper diffusion-preventing layers in the present invention. In contrast, Yamazaki et al. has a laminate film comprising a titanium film 1702, a film 1703 containing aluminum as its main component, and a titanium film 1704, where the lower surface is in direct contact with a gate insulator layer.

From the difference in structure stated above, in forming a high-integrated thin film transistor circuit, the electrode structure of the present invention is capable of supplying a minute electric current at low resistance compared to the wiring structure of Yamazaki et al. who uses an aluminum film or titanium film. In addition, the present invention includes side, upper and lower surfaces of a copper layer surrounded by the first and second copper

diffusion-preventing layers. Accordingly, there is an advantage of being able to prevent copper from diffusing, which causes lowering of the resistance of the gate insulator layer, resulting in malfunction. Further, there is an advantage of being able to prevent a reduction of yields, since the insulation property with respect to another thin film transistor, which provided thereby being an interlayer insulation film, is secured.

In contrast, in Yamazaki et al. the film which covers the laminate film comprising the titanium film 1702, the film 1703 containing aluminum as its main component, and the titanium fill 1704 is the conductive silicon films 1705. Although Yamazaki et al. describes using the nitride silicon film from preventing copper from diffusing, it does not teach or suggest where or how it is used. In particular, in column 4, lines 55-61 of Yamazaki et al. it is disclosed that "the second conductive layers 114 and 117 may be made from low electrical resistivity in materials such as aluminum (Al) or copper (Cu). For copper, however, it is necessary to use a structure in which copper is surrounded by silicon nitride in order to prevent diffusion of elemental copper." However, this does not teach or suggest Applicant's claim language because in Yamazaki et al. the first conductive layers 113 and 116, which make up the first gate electrode, are formed of an element such as silicon, titanium, tantalum from the alloy containing one of these elements as its main constituent. In addition, as can be seen in Figure 1A, because the second conductive layer 114 is in contact with the first conductive layer 113, even if Yamazaki et al. were modified to use copper for this second conductive layer, the second conductive layer would be in contact with the first conductive layer and there would be no diffusion-prevention layer below the second conductive layer 114 that covers the exposed surface of the multilayered structure, as recited in claim 37. In addition, Applicant notes that since the copper layer of the present invention has the forward tapered cross-section, it is possible to prevent the first and second copper diffusion-preventing layers which surround the copper layer from getting thin at the edge portion.

Thus, the present invention has a structure wherein diffusion of copper is prevented more effectively. Further, the present invention has the additional advantage of being able to improve the coverage of the interlayer insulation film formed on the upper layer and accordingly reduce the likelihood of a short in the upper layer wiring.

In contrast to Applicant's invention, the cross-section of the laminate film of Yamazaki et al. comprising titanium film 1702, film 1703 containing aluminum as its main component, and the titanium film 1704, which functions as a gate electrode, is in a typical rectangular form, which results in the problem that conductive silicon film 1705 becomes thin at the edge portion. From all of the above, Applicant believes that Claim 37 as presently amended is not anticipated by Yamazaki et al. In addition, Claim 38, which depends from Claim 37, is believed to be allowable because of its dependency from Claim 37.

Turning next to the rejection of Claims 30-36 as being unpatentable under 35 U.S.C. § 103(a) over Yamazaki et al. and Ueno et al., Applicant has amended Claim 30 to point out the distinguishing points over the combined teachings of Yamazaki et al. and Ueno et al. At the outset, Applicant makes reference to the differences between Yamazaki et al. and the claimed invention as set forth above. In the Official Action (page 5), it is asserted that Yamazaki et al. does not teach a metal seed layer formed on the first metal diffusion-preventing layer. The Official Action relies on Ueno et al. to make up for this deficiency of Yamazaki et al. In response, Applicant notes that although Ueno et al. does describe providing a copper seed layer on a copper diffusion-preventing layer, as asserted in the Official Action, that Ueno et al. does not teach or suggest the necessity of covering the copper wiring layer with a second copper diffusion-preventing layer, as set forth in the present invention. Accordingly, there is no reason to combine the teachings of Yamazaki et al. with Ueno et al, other than by using Applicant's invention as a template for modifying the claims in a hindsight reconstruction of Applicant's invention. In addition, Applicant notes

that the reason given in the Official Action (page 6) for making the modification is "for Yamazaki et al. to include in his invention that a metal seed layer formed on the first metal diffusion-preventing layer to improve adhesion metal to metal diffusion-preventing layer." However, Applicant find no description in the art to suggest that there was any problem with respect to adhesion of metal to metal, or why an artisan would have considered the modification to have been within their ordinary level of skill.

From all of the above, Applicant believes that Ueno et al does not make up for the deficiencies of Yamazaki et al. as set forth above, and that the rejection of Claims 30-36 as being unpatentable under 35 U.S.C. §103(a) over the combined teachings of Yamazaki et al. and Ueno et al. should be reconsidered and withdrawn.

From all of the above, Applicant believes that Claims 30, 31, and 33-38 are now in condition for allowance, and early indication to that effect is respectfully requested.

Respectfully submitted,

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